

WHAT IS CLAIMED IS:

1. A method of forming a color transform lookup table comprising:

the step of forming a first table describing the
5 correspondence between representative points in an input color space and output signal values when transition is from white to black;

the step of forming a second table describing the correspondence between representative points in an
10 input color space and output signal values when transition is from white to a first primary color;

the step of forming a third table describing the correspondence between representative points in an input color space and output signal values when
15 transition is from the first primary color to black;

the first interpolation step of forming a triangular plane OPQ which has black, white, and the first primary color as apexes O, P, and Q, respectively, which represents a color space, and in which the first
20 table corresponds to an axis PO, the second table corresponds to an axis PQ, and the third table corresponds to an axis OQ, and interpolating output signal values at lattice points when the triangular plane OPQ is divided into a lattice structure; and

25 the first replacement step of dividing the triangular plane OPQ into regions by using, as a boundary, a line AB connecting a lattice point A, on

the axis PO, which is before black output signal value
> 0 in the transition from P to O and a lattice point B,
on the axis QO, which is before black output signal
value > 0 in the transition from Q to O, and replacing
5 the interpolated black output signal value with 0 and
the output signal value of a complementary color
corresponding to the primary color with a predetermined
signal value, at individual lattice points in a region
in the direction of the axis PQ.

10 2. The method according to claim 1, further
comprising:

the step of forming a fourth table describing the
correspondence between representative points in an
input color space and output signal values when
15 transition is from white to a second primary color;

the step of forming a fifth table describing the
correspondence between representative points in an
input color space and output signal values when
transition is from the second primary color to black;

20 the second interpolation step of forming a
tetrahedron OPQR which has black, white, and the first
and second primary colors as apexes (O, P, Q, and R)
thereof, which represents a color space, and in which
the first table corresponds to an axis OP, the second
25 table corresponds to an axis PQ, the third table
corresponds to an axis QO, the fourth table corresponds
to an axis PR, and the fifth table corresponds to an

axis RO, and interpolating output signal values at lattice points when the tetrahedron OPQR is divided into a lattice structure; and

the second replacement step of dividing a
5 triangular plane P'Q'R' into regions, which is formed parallel to a triangular plane PQR as one surface of the tetrahedron OPQR, which is positioned inside the tetrahedron OPQR, and which has lattice points P', Q', and R' on axes OP, OQ, and OR, respectively, as apexes
10 thereof, by using, as a boundary, a line DE connecting a lattice point D, on an axis P'Q', which is before black output signal value > 0 in the transition from P' to Q' and a lattice point E, on an axis P'R', which is before black output signal value > 0 in the transition
15 from P' to R', and replacing the interpolated black output signal value with 0 and the output signal values of complementary colors corresponding to the first and second primary colors with a predetermined signal value, at individual lattice points in a region in the
20 direction of the apex P'.

3. The method according to claim 1, wherein the output signal value includes a set of C (cyan), LC (light cyan), M (magenta), LM (light magenta), Y (yellow), and K (black), and

25 the method further comprises the third replacement step of

replacing, if the complementary color replaced in

the first replacement step is C, the output signal value of the complementary color C with 0 and the output signal value of LC with a predetermined signal value, and

5 replacing, if the complementary color replaced in the first replacement step is M, the output signal value of the complementary color M with 0 and the output signal value of LM with a predetermined signal value.

10 4. The method according to claim 2, the output signal value includes a set of C (cyan), LC (light cyan), M (magenta), LM (light magenta), Y (yellow), and K (black), and

 the method further comprises the fourth
15 replacement step of
 replacing, if the complementary color replaced in the second replacement step is C, the output signal value of the complementary color C with 0 and the output signal value of LC with a predetermined signal
20 value, and

 replacing, if the complementary color replaced in the second replacement step is M, the output signal value of the complementary color M with 0 and the output signal value of LM with a predetermined signal
25 value.

5. A storage medium storing a control program for realizing the method according to claim 1 by a computer.

6. An apparatus for forming a color transform lookup table which is looked up when input image data is to be converted into subtractive mixture image data, comprising:

5 means that forms a first table describing the correspondence between representative points in an input color space and output signal values when transition is from white to black;

10 means that forms a second table describing the correspondence between representative points in an input color space and output signal values when transition is from white to a first primary color;

15 means that forms a third table describing the correspondence between representative points in an input color space and output signal values when transition is from the first primary color to black;

20 first interpolating means that forms a triangular plane OPQ which has black, white, and the first primary color as apexes O, P, and Q, respectively, which represents a color space, and in which the first table corresponds to an axis PO, the second table corresponds to an axis PQ, and the third table corresponds to an axis OQ, and interpolating output signal values at lattice points when the triangular plane OPQ is divided
25 into a lattice structure; and

first replacing means that divides the triangular plane OPQ into regions by using, as a boundary, a line

AB connecting a lattice point A, on the axis PO, which is before black output signal value > 0 in the transition from P to O and a lattice point B, on the axis QO, which is before black output signal value > 0 in the transition from Q to O, and replacing the interpolated black output signal value with 0 and the output signal value of a complementary color corresponding to the primary color with a predetermined signal value, at individual lattice points in a region in the direction of the axis PQ.

7. An image processing method of forming a lookup table for transforming image data into a printing material color, comprising the steps of:

forming data on sides of a triangle representing a color space having white, black, and a primary color as apexes thereof; and

forming data inside the triangle on the basis of the formed data on the sides of the triangle,

wherein when the data inside the triangle is to be formed, a formation method is controlled in accordance with the output signal value of black on a side from white to black.

8. The method according to claim 7, wherein the data inside the triangle is formed using interpolation.

9. The method according to claim 8, wherein the formation method is controlled by changing a method of selecting points for use in the interpolation.

10. The method according to claim 8, wherein
in the formation of the data inside the triangle,
interpolation for a color component corresponding to a
primary color belonging to the triangle is different
5 from interpolation for another color component, and
the control corresponding to the output signal
value of black is performed for a color component
corresponding to the primary color.
11. The method according to claim 8, the formation
10 method is controlled by changing the direction of
linear interpolation.
12. The method according to claim 11, wherein the
direction of linear interpolation is determined such
that
15 in a region in which the output signal value of
black is 0 on the side from white to black, linear
interpolation is performed in the directions of a
white-black line and a white-primary color line, and
in a region in which the output signal value of
20 black is larger than 0 on the side from white to black,
linear interpolation is performed in the directions of
the white-black line and a primary color-black line.
13. The method according to claim 7, wherein the
primary color includes cyan, magenta, yellow, red,
25 green, and blue.
14. A program for realizing an image processing
method of forming a lookup table for transforming image

data into a printing material color, comprising:

a program code of the step of forming data on sides of a triangle representing a color space having white, black, and a primary color as apexes thereof;

5 and

a program code of the step of forming data inside the triangle on the basis of the formed data on the sides of the triangle, the step comprising, when the data inside the triangle is to be formed, controlling a formation method in accordance with the output signal value of black on a side from white to black.

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